

National Aeronautics and Space Administration

FINAL TECHNICAL REPORT FOR NAG 5-2729

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Title(s) of Research: Search for Hard X-Ray Emission from Aquila X-1;
High Energy Emission from Gamma-Ray Radio Star
2CG 135+1/LSI 61 305

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Final Technical Report for NAG5-2729
Search for Hard X-Ray Emission from Aquila X-1;
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Several investigations supported by these CGRO grant were completed or are close to completion.

The study of EGRET data for the unidentified source 2CG 135+01 was very fruitful. We discovered transient gamma-ray emission by combining several data obtained since 1994 through 1997 [1]. It is the first time that time variable emission is established for this enigmatic source, and clearly an interpretation in terms of an isolated radio pulsar (Geminga-like) is disfavored now. Our preferred model is a Galactic source, probably an energetic pulsar (such as PSR129-63) in a binary system producing gamma-rays because of pulsar wind/mass outflow interaction. We also accumulated many data concerning the radio source LSI 61 303, the possible counterpart of 2CG 135+01. We show that a possible anti-correlation between radio and gamma-ray emission exists [2]. This anticorrelation is evident only in the energy range above 100 MeV, as demonstrated by the lack of it obtained from OSSE data [3]. If confirmed, this anti-correlation would prove to be very important for the interpretation of the hundreds of unidentified gamma-ray sources currently discovered by EGRET near the Galactic plane, and would point to a new class of sources in addition to AGNs and isolated pulsars.

We also completed the analysis of several time variable gamma-ray sources near the Galactic plane, with the discussion of evidence for transient emission from 2EG J1813-12 and 2EG J1828+01 [4].

We completed several investigations regarding gamma-ray bursts (GRBs), including the study of the brightness distribution for different spectral/duration GRB sub-classes [5], an investigation of acceleration processes and their consequences for GRB afterglow emission [6], the application of the synchrotron shock model of GRBs to X-ray energies [7].

References

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